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February 6, 2002

**BY ELECTRONIC FILING**

Mr. William Caton  
Acting Secretary  
Federal Communications Commission  
445 12<sup>th</sup> Street, S.W.  
Washington, D.C. 20554

**Re: Written Ex Parte Presentation**  
**ET Docket No. 98-153**

Dear Mr. Caton:

On behalf of my client QUALCOMM Incorporated ("QUALCOMM"), attached for filing is a written ex parte presentation in the above-referenced proceeding.

Sincerely yours,

Dean R. Brenner  
Attorney for QUALCOMM Incorporated

cc: Edward Thomas  
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## **1. Summary**

QUALCOMM submits this written ex parte presentation to present the Commission with important information with respect to two related issues in the ultra wideband (“UWB”) proceeding. First, as a follow up to QUALCOMM’s February 1, 2002 filing, QUALCOMM presents herein recent test results demonstrating the very good performance of its E911 technology (known as gpsOne) indoors. These test results confirm that gpsOne can meet the Commission’s E911 mandate even indoors. The test was conducted on the second floor of an office building in an office environment in which personal computers and laptops (i.e., Part 15 devices) were running. The tests did not show that the gpsOne receiver experienced any interference problem equivalent to the type of harmful interference that QUALCOMM experienced when it tested the performance of a gpsOne receiver with a nearby UWB device in the tests summarized in QUALCOMM’s January 11, 2002 filing. Consequently, in adopting emissions limits for UWB devices, the Commission should ensure that this high quality indoor E911 service based on gpsOne, which will enhance the public’s safety, is not degraded due to harmful interference from UWB devices.

Second, QUALCOMM presents herein the rationale for its proposed emission limits for the cellular, PCS, and GPS bands. The limits proposed by QUALCOMM would provide the necessary protections so that the American public could enjoy the benefits of reliable, precise, and robust E911 and wireless service, while at the same time permitting the deployment of UWB devices. The attached analysis is based on QUALCOMM’s testing of the harmful interference from a UWB device to wireless calls in general (filed with the Commission in March 2001) and to E911 calls in particular (filed in January 2002). There are no test results showing an absence of such interference.

## **2. Results of Indoor Tests of gpsOne**

The position measurements returned by the wireless network using gpsOne can be classified into three categories based on the source of the location determination.

1. GPS-based: The solution is computed from GPS measurements only
2. Hybrid: A mix of pilots and GPS measurements is used to estimate the solution
3. AFLT (Assisted Forward Link Timing): Only CDMA pilot phase measurements are used in the solution

Generally, if sufficient number of satellites (four or more) are visible to the phone, and their signal quality is acceptable to determine a location, then the solution is a GPS based one. If there insufficient number of acceptable signal quality satellites visible to the phone, then the hybrid solution is used. In this case, the phone and the network utilize the GPS measurements as well as pilot timing and phase estimates to compute the solution. Finally, if no satellites are visible to the phone, then the solution is entirely network based whereby, pilot measurements from multiple base stations are used to arrive at the final position.

QUALCOMM presents herein one set of test data from tests of gpsOne in an indoor environment.

Indoor Location: Vendor lab at SnapTrack, Qualcomm office in Campbell California, Inside office of second story, steel framed building

The test site was in the second floor of one of Qualcomm's office buildings in Campbell, California. This site is representative of a standard office with several FCC Part 15 devices such as personal computers and laptops operating. The test was conducted on September 18, 2001 using a commercial handset which incorporated gpsOne technology.

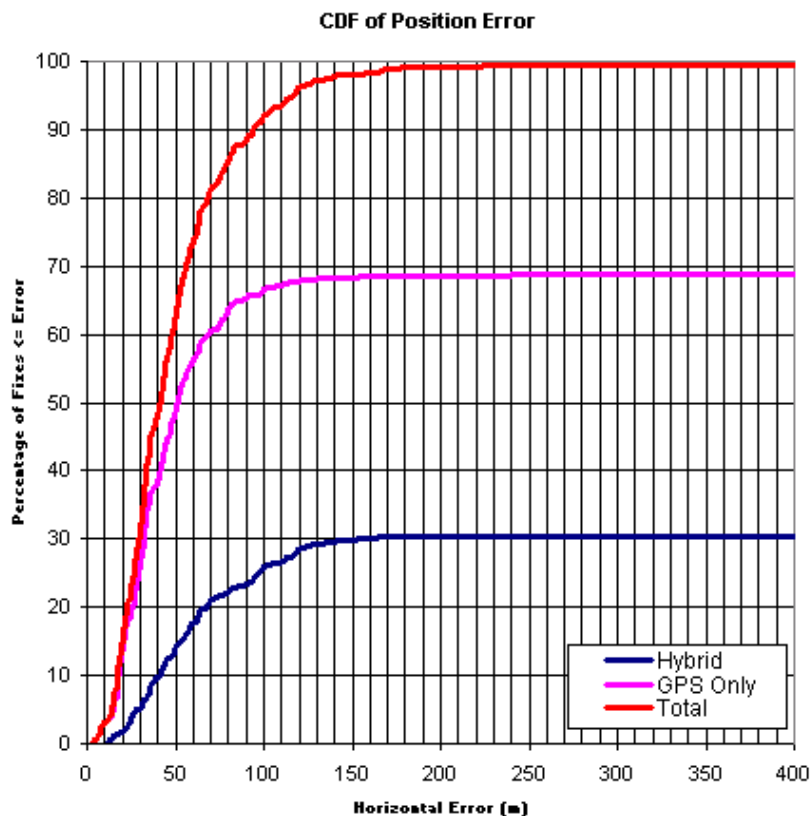
Figure 3, shows that about 30% of the samples used a hybrid solution and the remaining 70% used a GPS only solution. As shown in the curve below, showing the total distribution of the position error for the calls tested, the test results were that the 95<sup>th</sup> and 67<sup>th</sup> percentile position error was about 115 meters and 53 meters respectively, meaning that for 95% of the calls, the position error was 115 meters or less, and for 67% of the calls, the position error was 53 meters or less. Thus, in this test of the indoor performance of gpsOne, the technology substantially exceeded the overall performance required by the FCC's mandate for 95% of all calls (indoor and outdoor) and came within 3 meters of the required performance for 67% of all calls (indoor and outdoor).



Figure 1: Office, View 1



Figure 2: Office, View 2



**Figure 3: Position Error Distribution**

The cumulative distribution of position error for the two modes of operation along with the total distribution is shown in the plots above. In the y-axis of the plots, the term “fixes” is synonymous to “samples.”

The gpsOne algorithm relies not only on GPS measurements transmitted via the GPS band, but also on pilot measurements communicated via the PCS and cellular bands. The preceding data clearly shows that on several occasions, the gpsOne receiver had to utilize the hybrid mode to obtain a location. This inherently means that the PCS and cellular bands must be free from any form of interference so that accurate measurements can be made.

It is not sufficient simply to protect the GPS spectrum and assume that the positioning algorithm will work perfectly. Several UWB proponents have proposed reduced emissions limits for only the GPS band under the misguided assumption that the same

amount of protection is not required for the PCS and cellular bands. The data presented in this report and in QUALCOMM's other filings in this proceeding demonstrate that the PCS and cellular bands should be afforded emissions protection of a magnitude similar to the GPS band. Any excess UWB interference within the GPS, PCS and cellular bands will significantly raise the noise floor of the gpsOne receiver and deteriorate its positioning accuracy or render it completely useless.

### **3. UWB Emission Limits**

The analysis on the pages in the accompanying power point pages sets out the emission limits that are necessary to protect wireless phones operating over both the GPS and the PCS and cellular bands from harmful interference from UWB devices. These limits are fully justified by QUALCOMM's testing, which is not contradicted in the record of this proceeding. QUALCOMM calculates that UWB emissions should be limited to 42.4 dB below the current Part 15 level in the GPS band and 40.3 dB below the current Part 15 level in the cellular and PCS bands. These limits are necessary to protect both E911 calls and other wireless calls against interference from a single UWB device and from the aggregate interference from multiple UWB devices. The limits would protect gpsOne (E911) receivers to within 6 feet of a UWB device, assuming a minimum GPS signal of -147 dBm, the signal level which is about to be adopted as the worldwide standard for E911 receivers operating over the CDMA air interface.